

DIVISION 600 - MISCELLANEOUS CONSTRUCTION

SECTION 601 - GABIONS AND MATTRESSES

601.01 Description This work shall consist of furnishing, assembling, filling with stones and lacing wire mesh baskets, hereafter called gabions or mattresses, constructed in accordance with these specifications and placed in conformity with the lines, grades and dimensions shown on the plans or established.

601.02 Materials Materials shall conform to the requirements specified in the following Sections of Division 700 - Materials.

Gabion	711.02
Stones for Gabions	711.03
Mattresses	711.07
Stones for Mattresses	711.08

601.03 Fabrication Gabions and mattresses shall be manufactured so that their sides, ends, lid, and diaphragm(s) can be assembled to form rectangular units of the specified dimensions.

Gabions shall be of a single unit construction. The front, base, back and lid shall be woven into a single unit. The ends and diaphragm(s) shall be factory connected to the base.

The base, sides, and two ends of mattresses shall be of a single unit construction woven into a single unit. Diaphragm(s) shall be factory connected to the base. The lid may be a separate unit.

Perimeter edges of the mesh forming the gabion or mattress shall be securely fastened so that joints have at least the same strength as the wire mesh itself.

The wire mesh shall be fabricated to be non-raveling. Non-raveling is defined as the ability to resist pulling apart at any of the twists or connections forming the mesh when a single wire in a section of mesh is cut and the section of mesh then subjected to the load test described in the materials specification.

The gabion length shall be 1½, 2, 3, or 4 times its horizontal width. The horizontal width shall not be less than 900 mm [36 in]. However, all gabions furnished by the manufacturer shall be of uniform width. Where the gabion length exceeds 1½ times its horizontal width, the gabion shall be equally divided into cells by diaphragm(s) of the same mesh and gauge as the gabion body.

Mattresses shall be at least 1.8 m by 1.8 m [6 ft by 6 ft] and equally divided by transverse diaphragms.

601.04 Assembling Gabions and mattresses shall be supplied folded flat, tied in pairs and packed in bundles. Single units shall be removed from the bundle; unfolded flat on the ground and all kinks and bends flattened.

The units shall be assembled individually by erecting the front side, back side, ends, and diaphragm(s), assuring that all creases are in the correct position and the tops of all sides level.

The four corners of each unit shall be laced first, followed by the edges of internal diaphragm(s) to the sides.

The lacing procedures for lacing corners and units together shall consist of cutting a length of lacing wire approximately 1½ times the distance to be laced, not to exceed 1.5 m [5 ft], securing the wire terminal at the corner by looping and twisting, then proceeding to lace with alternating single and double loops at approximately 125 mm [5 in] intervals and securely fasten the other wire terminal.

The mattresses shall not be assembled in their final location, except as required for lacing adjacent units together. This is to maintain a uniform bedding surface for installation as described in Section 601.051.

At the option of the Contractor, approved locking wire fasteners may be used in lieu of lacing wire provided they are used in every mesh opening along the joint, each ring is formed such that the ends interlock and the fasteners be of stainless steel construction with a minimum thickness of 3.17 mm [0.125 in], meeting the requirements of ASTM A213, Type 302.

601.05 Installation of Gabions The assembled gabion units shall be placed in the proper location. All adjoining empty gabions shall be placed along the perimeter of the gabion contact surfaces to obtain a monolithic structure.

Once the gabion units are laced together, they shall be stretched to effective alignment. This operation shall be carried out after several empty gabion units have been positioned. The first gabion in the line shall be partially filled to provide the necessary anchorage prior to stretching. Stretching shall be carried out using a means of stretching of at least 900 kg [1 ton] capacity.

While under tension, the gabion shall be carefully controlled against any possible unraveling.

Whenever gabion structures require more than one tier, the upper empty gabion tier, while under tension, shall be laced to the top of the lower one.

601.051 Installation of Mattresses If the mattress is to be placed in the dry, the assembled unit shall be placed in the proper location after it is assembled as described in Section 601.04. Several empty units shall be laced together along the contact surfaces to obtain a monolithic structure. Care shall be taken to maintain a uniform surface on the bedding material.

If the mattresses are to be placed underwater, they may be laced together, filled in the dry, and then placed in final position.

If the mattresses are polyvinyl chloride coated, they shall not be dragged, but shall be placed in a manner so as not to damage the coating.

601.052 Filter Fabric A filter fabric in accordance with Section 722.02 - Drainage Geotextile, shall be placed on the subgrade, backslope, and sides of the excavation. If earthfill is to be placed over the gabions, filter fabric shall be placed top of the gabions before earthfill placement.

601.06 Filling Gabions and mattresses shall be filled in strict accordance with the manufacturer's recommendations, one copy of these recommendations will be supplied to the Resident. Care shall be taken when placing stones inside gabions and mattresses in an effort to prevent distortion and ensure proper alignment.

Care shall be taken when placing fill material to assure that the sheathing on coated units will not be broken or damaged.

Gabions shall be filled in layers, 300 mm [1 ft] at a time. Two connecting wires shall be placed between each layer in all cells along all exposed faces of the gabion structure. All connecting wires shall be looped around two mesh openings and the wire terminals shall be securely twisted to prevent their loosening.

The cells in any row shall be filled in stages so that local deformation will be avoided. At no time shall any cell be filled to a depth exceeding 300 mm [1 ft] more than the adjoining cell.

Along all exposed gabion faces, the outer layer of stone shall be carefully placed and packed by hand to ensure proper alignment and a neat, compact, square appearance. No sharp edges of stone shall protrude through the wire mesh. The last layer of stone shall be leveled with the top of the gabion or mattress to allow proper closing of the lid and provide an even surface for the next course.

Gabions and mattresses shall be well packed and full without excessive bulging.

601.061 Filling of Hand Filled Gabions The assembled gabion units shall be placed in the proper location. A form shall then be placed along the front face and any side face not adjacent to an already placed gabion, and anchored to formwork on the back face to provide a rigid frame rectangle before filling with stone.

The forms shall be sufficiently braced and tied to prevent distortion while the stones are being placed.

On all exposed gabion faces, the outer layer of stone shall be carefully placed and packed by hand to ensure proper alignment and a neat, compact, square appearance. No sharp edges of stone shall protrude through the wire mesh.

Care shall be taken when placing fill material to assure that the sheathing on coated units will not be broken or damaged.

Gabions shall be filled by hand in 300 mm [1 ft] layers. Two connecting wires shall be placed between each layer in all cells along all exposed faces of the gabion structure.

All connecting wires shall be looped around two mesh openings and the wire terminals shall be securely twisted to prevent their loosening.

The cells in any row shall be filled in stages so that local deformation will be avoided. At no time shall any cell be filled to a depth exceeding 300 mm [1 ft] more than the adjoining cell.

The last layer of stone shall be leveled with the top of the gabion or mattress to allow proper closing of the lid and provide an even surface for the next course.

At no time will any stones be placed by machine.

Complete gabions shall have a maximum deviation from the designated shape of 25 mm in 1 m [1 inch in 3 ft]. Gabions not meeting this tolerance will be emptied, adjustments made, and refilled.

601.07 Lid Closing The lids shall be stretched tightly over the filling, using crowbars or lid closing tools, until the lid meets the perimeter edges of the front and end panels. The lid shall then be tightly laced along all edges, ends, and diaphragms in the same manner as described above for assembly.

601.08 Cutting and Folding Mesh Where shown on the drawings or when otherwise directed, the mesh shall be cut, folded, and wired together to suit existing site conditions. The mesh must be cleanly cut and the surplus mesh cut out completely or folded back and neatly wired to an adjacent face. The cut edges of the mesh shall be securely laced together with lacing wire in the manner as described above for assembling.

601.09 Method of Measurement Gabions and mattresses will be measured for payment by the cubic meter [cubic yard] to the neat line dimensions shown on the plans.

601.10 Basis of Payment Payment for gabions and mattresses will be made at the contract unit price per cubic meter [cubic yard] in place. Payment will be full compensation for excavating to place gabions and backfill material, for preparing and fine grading the foundations area, for furnishing and placing backfill material under and behind the gabions and for furnishing and placing all necessary gabion units including wire mesh baskets, lacing wire, rock fill and all labor and equipment necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
601.21 Gabions, Galvanized	cubic meter [Cubic Yard]
601.211 Gabions, Galvanized and Hand Filled	cubic meter [Cubic Yard]
601.22 Gabions, PVC Coated	cubic meter [Cubic Yard]
601.221 Gabions, PVC Coated and Hand Filled Yard]	cubic meter [Cubic
601.23 Mattresses, Galvanized: _____	cubic meter [Cubic Yard]
601.24 Mattresses, PVC Coated: _____	cubic meter [Cubic Yard]

SECTION 602 - PIPE LINING

Reserved

SECTION 603 - PIPE CULVERTS AND STORM DRAINS

603.01 Description This work shall consist of constructing or reconstructing pipe culverts and storm drains, in accordance with these specifications, the Standard Detail plans and in reasonably close conformity with the lines and grades shown on the plans or established.

The word "pipe" in these specifications shall include both round pipe and pipe arches..

603.02 Materials Meet Sections:

Joint Mortar	705.02
Flexible Gaskets	705.03
Flexible Culvert Polyvinylchloride (PVC) Pipe	706.08
Corrugated Steel, Metallic Coated Pipe	707.02
Fiber-bonded Corrugated Steel Pipe & Pipe Arches	707.04
Corrugated Aluminum Alloy Pipe & Pipe Arches	707.06
Polymer Precoated, Galvanized Corrugated Steel	707.07